1. (Thrice Amended) A method for characterizing DNA, which comprises:

(i) providing a population of fragments of said DNA, each fragment having cleavably attached thereto a mass label for identifying a feature of that fragment;

(ii) separating the fragments on the basis of their length by capillary electrophoresis, thereby determining the length of each fragment;

(iii) cleaving each fragment in a mass spectrometer to release its mass label; and

(iv) determining each mass label by mass spectrometry to relate the feature of each fragment to the length of the fragment in order to characterize said DNA.

27. (Twice Amended) A method for characterizing DNA, which comprises:

(a) providing at least one DNA single-stranded template primed with a primer;

(b) generating a population of fragments of said DNA from the at least one template by contacting the at least one template in the presence of DNA polymerase with a mixture of nucleotides for hybridising to the at least one template for forming a second strand of DNA complementary to the at least one template, wherein the mixture further comprises a set of four probes containing all four nucleotides for hybridising to the at least one template in which the nucleotide of each probe comprises a modified nucleotide or oligonucleotide which is capable of polymerising to the second strand of DNA but blocked to prevent further polymerisation thereto, which modified nucleotide or oligonucleotide is cleavably attached to the mass label for identifying the modified nucleotide or oligonucleotide, which mass label is cleavable from the probe in a mass spectrometer and is resolvable by mass spectrometry, and wherein each fragment is terminated with one of the probes, wherein the

population comprises at least one series of DNA fragments, the series containing all possible lengths of a second strand of DNA complementary to the or each template;

(c) separating the fragments by capillary electrophoresis, thereby determining the length of each fragment;

(d) cleaving each fragment in a mass spectrometer to release its mass label; and

(e) determining each mass label by mass spectrometry to identify a terminating modified nucleotide or oligonucleotide of each fragment by the length of the fragment in order to characterize said DNA.

28. (Amended) A method for characterizing DNA, which comprises:

(a) providing at least one strand of the DNA as a single-stranded template primed with a set of oligonucleotide primers, each of which primers comprises a mass label cleavably attached to an oligonucleotide primer base sequence for hybridising to a single-stranded DNA template to form a primed template, wherein each mass label is cleavable from the primer in a mass spectrometer, uniquely resolvable in relation to every other mass labels in the set by mass spectrometry and identifies the oligonucleotide primer base sequence; and

(b) generating a population of fragments of said DNA from the and each template by contacting the and each template in the presence of DNA polymerase with a mixture of nucleotides for hybridising to the and each template for forming a second strand of DNA complementary to the and each template, wherein the population comprises at least one

series of DNA fragments, the series containing all possible lengths of a second strand of DNA complementary to the or each template;

wherein a feature of each fragment identified by each mass label relates to a nucleotide or nucleotide sequence at one end of each fragment, so that each nucleotide corresponds to a position in the template primed with the primers comprising the mass label so as to deduce the sequence of the or each template in order to characterise the DNA.